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Preprint from the 1984

BUREAU OF MINES MINERALS YEARBOOK

The Mineral Industry of Arkansas

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UNITED STATES DEPARTMENT OF THE INTERIOR • Donald Paul Hodel, Secretary

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This publication is a chapter from the current Bureau of Mines Minerals Yearbook, comprising *Volume I, Metals and Minerals; Volume II, Area Reports: Domestic; Volume III, Area Reports: International.* The separate volumes of the Yearbook are sold by the Superintendent of Documents, Washington, D.C. 20402.

The Mineral Industry of Arkansas

This chapter has been prepared under a Memorandum of Understanding between the Bureau of Mines, U.S. Department of the Interior, and the Arkansas Geological Commission for collecting information on all nonfuel minerals.

By James R. Boyle[1] and William V. Bush[2]

The value of Arkansas' nonfuel mineral production in 1984 was $272.6 million, an increase of $26.2 million over that of 1983. The increase was the first since 1979 when Arkansas achieved its record high value output of over $300 million. The increase reversed a 4-year decline that in 1983 resulted in the lowest value of production since 1975. Output of most nonfuel minerals increased with bromine and lime being the exceptions. The leading nonmetallic commodities in terms of value were bromine, cement, crushed stone, and sand and gravel. The State was a major producer nationally of abrasives, bauxite, and bromine. Construction minerals—crushed stone and sand and gravel—also contributed significantly to the State's economy, serving both local and regional markets.

Arkansas ranked first nationally in output of bauxite, bromine, and special silica stone for natural abrasive applications (oilstones and whetstones). The State was one of three that produced tripoli. Despite its national importance with regard to several minerals, Arkansas ranked 27th in the Nation in value of nonfuel minerals produced.

Table 1.—Nonfuel mineral production in Arkansas[1]

Mineral	1983		1984	
	Quantity	Value (thousands)	Quantity	Value (thousands)
Clays thousand short tons	879	$9,956	1,019	$7,838
Gem stones	NA	200	NA	200
Sand and gravel:				
Construction thousand short tons	e6,900	e19,600	8,334	23,786
Industrial do.	386	4,796	459	6,207
Stone:				
Crushed do.	13,448	51,267	e15,200	e59,800
Dimension do.	9	573	--	--
Talc do.	7	66	W	W
Combined value of abrasives, bauxite, bromine, cement, gypsum, lime, tripoli, vanadium (1984), and value indicated by symbol W	XX	159,972	XX	174,797
Total	XX	246,430	XX	272,628

eEstimated. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" figure. XX Not applicable.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

Table 2.—Value of nonfuel mineral production in Arkansas, by county[1]

(Thousands)

County	1982	1983	Minerals produced in 1983 in order of value
Ashley	$154	(2)	
Baxter	(3)	$664	Stone (crushed).
Benton	(3)	996	Do.
Boone	(3)	524	Do.
Bradley	5	(2)	
Calhoun	W	(2)	
Carroll	127	W	Stone (crushed).
Clark	W	W	Stone (crushed), clays.
Clay	186	(2)	
Cleburne	1	W	Stone (crushed).
Columbia	W	W	Bromine.
Conway	1	(2)	
Craighead	W	64	Clays.
Crawford	W	W	Stone (crushed), sand and gravel (construction).
Crittenden	W	W	Clays.
Cross	261	(2)	
Dallas	24	(2)	
Drew	13	(2)	
Faulkner	W	439	Stone (crushed).
Franklin	W	(2)	
Fulton	44	83	Stone (crushed).
Garland	5,988	W	Stone (crushed), abrasives.
Grant	162	(2)	
Greene	283	(2)	
Hempstead	W	W	Sand and gravel (industrial), clays.
Hot Spring	3,859	1,611	Stone (crushed), clays, abrasives.
Howard	W	W	Cement, gypsum, stone (crushed).
Independence	W	W	Stone (crushed), lime, stone (dimension).
Izard	W	W	Sand and gravel (industrial), stone (crushed).
Jefferson	W	(2)	
Johnson	W	W	Clays.
Lafayette	180	(2)	
Lawrence	W	4,670	Stone (crushed).
Lincoln	169	(2)	
Little River	W	W	Cement, stone (crushed).
Logan	(3)	433	Stone (dimension), stone (crushed).
Lonoke	(3)	(3)	
Madison	W	(2)	
Marion	483	(2)	
Miller	W	W	Sand and gravel (industrial), clays.
Mississippi	20	(2)	
Montgomery	W	W	Stone (crushed), clays.
Nevada	33	(2)	
Newton	7	W	Stone (crushed).
Ouachita	W	W	Clays.
Perry	1	846	Stone (crushed).
Pike	1,481	W	Gypsum.
Poinsett	W	(2)	
Polk	16	(2)	
Pope	(3)	780	Stone (crushed).
Pulaski	W	W	Stone (crushed), clays.
Randolph	5	28	Stone (crushed).
St. Francis	W	(2)	
Saline	12,305	W	Bauxite, lime, talc, stone (crushed).
Scott	18	(2)	
Searcy	(4)	(2)	
Sebastian	W	W	Stone (crushed), clays.
Sevier	295	W	Stone (crushed).
Stone	W	(2)	
Union	W	W	Bromine.
Van Buren	(3)	--	
Washington	1	737	Stone (crushed).
White	13	989	Do.
Yell	W	(2)	
Undistributed[5]	175,368	213,967	
Sand and gravel (construction)	XX	e19,600	
Stone:			
Crushed	e48,500	XX	
Dimension	r e574	XX	
Total[6]	r250,572	246,430	

eEstimated. rRevised. W Withheld to avoid disclosing company proprietary data; included with "Undistributed." XX Not applicable.

[1]No production of nonfuel mineral commodities was reported for counties not listed.

[2]Construction sand and gravel was produced; data not available by county. Total State value is shown separately under "Sand and gravel (construction)."

[3]Crushed and dimension stone was produced; data not available by county. Total State value is shown separately under "Stone."

[4]Less than 1/2 unit.

[5]Includes gem stones that cannot be assigned to specific counties and values indicated by symbol W.

[6]Data do not add to totals shown because of independent rounding.

Table 3.—Indicators of Arkansas business activity

		1982[r]	1983	1984[p]
Employment and labor force, annual average:				
Population	thousands	2,307	2,325	2,349
Total civilian labor force	do.	1,025	1,028	1,045
Unemployment	do.	100	104	92
Employment (nonagricultural):				
Mining total[1]	do.	5.9	5.3	5.6
Metal mining[2]	do.	.3	.2	NA
Nonmetallic minerals except fuels[2]	do.	1.3	1.2	NA
Coal mining[2]	do.	.1	(3)	NA
Oil and gas extraction	do.	4.2	4.0	4.1
Manufacturing total	do.	195.2	200.3	213.5
Primary metal industries	do.	6.4	6.6	7.8
Stone, clay, and glass products	do.	4.5	4.7	4.9
Chemicals and allied products	do.	6.9	6.3	6.1
Petroleum and coal products	do.	1.4	1.4	1.2
Construction	do.	29.9	30.0	34.3
Transportation and public utilities	do.	42.7	42.7	45.3
Wholesale and retail trade	do.	158.2	163.0	173.5
Finance, insurance, real estate	do.	32.4	34.1	35.8
Services	do.	119.8	128.6	134.1
Government and government enterpri	do.	136.0	137.3	140.4
Total	do.	720.1	741.3	782.5
Personal income:				
Total	millions	$19,383	$20,546	$23,033
Per capita		$8,402	$8,838	$9,805
Hours and earnings:				
Total average weekly hours, production workers		38.6	40.1	40.5
Total average hourly earnings, production workers		$6.69	$7.05	$7.31
Earnings by industry:				
Farm income	millions	$671	$590	$1,132
Nonfarm	do.	$12,314	$13,411	$14,836
Mining total	do.	$201	$153	$170
Metal mining	do.	$6	$4	$5
Nonmetallic minerals except fuels	do.	$23	$22	$25
Coal mining	do.	$3	$1	$2
Oil and gas extraction	do.	$169	$126	$139
Manufacturing total	do.	$3,448	$3,785	$4,232
Primary metal industries	do.	$154	$169	$219
Stone, clay, and glass products	do.	$87	$97	$108
Chemicals and allied products	do.	$191	$185	$180
Petroleum and coal products	do.	$44	$49	$44
Construction	do.	$663	$700	$807
Transportation and public utilities	do.	$1,125	$1,221	$1,325
Wholesale and retail trade	do.	$2,078	$2,241	$2,486
Finance, insurance, real estate	do.	$568	$677	$739
Services	do.	$2,062	$2,327	$2,549
Government and government enterprises	do.	$2,110	$2,247	$2,462
Construction activity:				
Number of private and public residential units authorized		6,385	10,070	9,150
Value of nonresidential construction	millions	$253.2	$282.5	$356.9
Value of State road contract awards	do.	$88.3	$115.4	$169.6
Shipments of portland and masonry cement to and within the State	thousand short tons	584	696	761
Nonfuel mineral production value:				
Total crude mineral value	millions	$250.6	$246.4	$272.6
Value per capita		$108	$106	$116

[p]Preliminary. [r]Revised. NA Not available.

[1]Bureau of Labor Statistics, U.S. Department of Labor; totals may not add because of inclusion of data from other sources.

[2]Bureau of Economic Analysis, Regional Economic Measurement Division, U.S. Department of Commerce.

[3]Less than 50 employees.

Sources: U.S. Department of Commerce, U.S. Department of Labor, Highway and Heavy Construction Magazine, and U.S. Bureau of Mines.

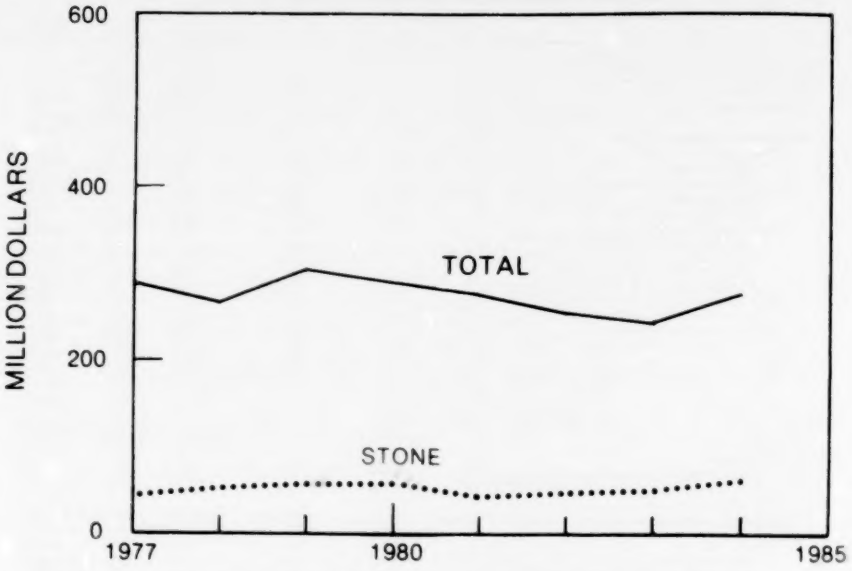

Figure 1.—Value of stone and total value of nonfuel mineral production in Arkansas.

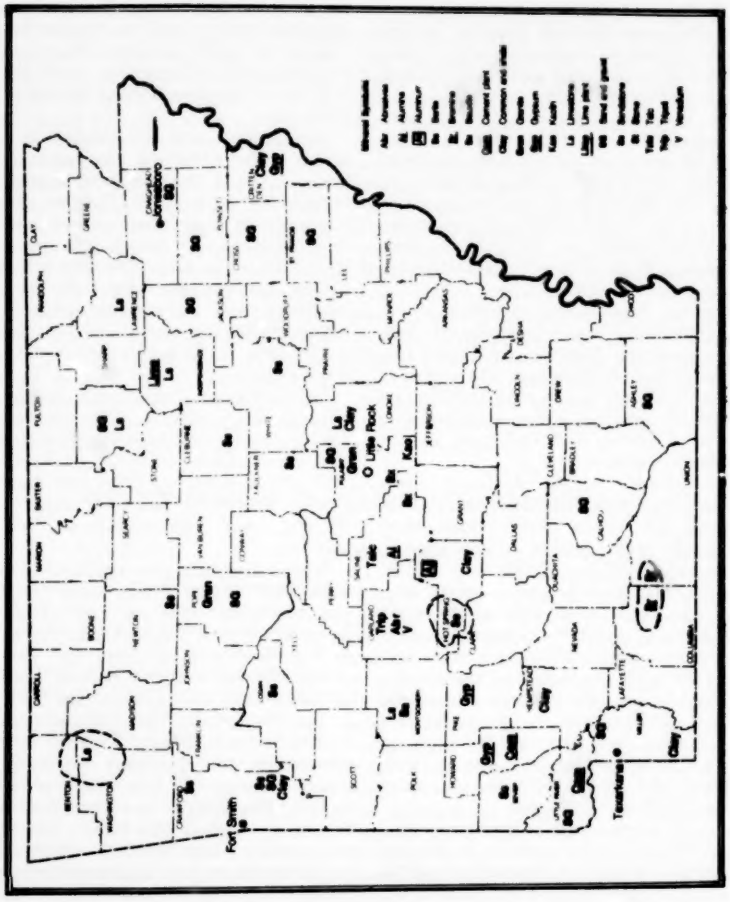

Figure 2.—Principal mineral producing localities in Arkansas.

Trends and Developments.—After a 4-year decline, output of minerals picked up during 1984. Increased orders were also noted at plants that manufacture valves and pipe fittings, predominantly foundry output. The recovery started late in 1983 and continued through most of 1984 with a downturn at yearend. Imports, along with the national recession, severely impacted on output of barite and vanadium, with no production of barite since 1982.

Foreign investment in Arkansas was limited in the mineral-related fields to agricultural chemicals (Federal Republic of Germany), aluminum extrusions and roofing products (France), and activated bauxite (Republic of South Africa).

The Arkansas State Chamber of Commerce reported that $992 million in investments for industrial growth was announced in 1984, down from $1 billion in 1983. The announced investments were expected to create an estimated 12,000 jobs, compared with 11,000 created in 1983. Of the total expansions, 11 were in mineral-related areas and totaled over $66 million.

Arkansas' exports totaled nearly $5 billion annually and were predominantly agriculture products. Notable mineral exports included quartz to Belgium, whetstones to Europe, and rice hull ash to the Federal Republic of Germany where, because of its high silica content, it was used in the manufacture of steel.

Total tonnage on the Arkansas River increased from 8 million short tons in 1983 to nearly 9.5 million tons in 1984. More commodities were shipped in 1984 than in any year since the record-high year of 1978, when 9.8 million tons was shipped. Outbound shipments were 45% of the total, while internal movements comprised 26%; inbound shipments, 22%; and shipments passing through the mouth of the system, 7%. Sand and gravel shipments increased 32% to 2.4 million tons, coal increased 28% to 1.3 million tons, chemical fertilizer increased 47% to 1 million tons, iron and steel increased 54% to 800,000 tons, and stone increased 69% to 177,000 tons.

The U.S. Army Corps of Engineers completed a $250 million project on the Ouachita River in southern Arkansas—two locks and dams along with a 9-foot channel connecting Camden to the Mississippi River. Anticipated mineral traffic includes bromine, sand and gravel, and stone.

Employment.—The unemployment rate dropped from 10.1% at yearend 1983 to below 8% in September, but ended 1984 at 9.2%. Employment levels in mineral-related industries reacted in a mirror image, with employment picking up at midyear and dropping late in the year. Construction employment peaked at midyear and remained at about the same level through the balance of 1984, indicating that demand for construction minerals remained firm throughout the latter part of the year.

According to the Arkansas Employment Security Division, the most significant increase during 1984 occurred in the metal products division where employment increased by 1,900 positions. Manufacturing employment increased over 13,000 but was still below the record high of 223,000 in mid-1978.

Legislation and Government Programs.—The Arkansas Legislature meets biennially with the next session scheduled to begin in January 1985. The first year of a 3-year phased-in increase in severance taxes on clays, sand and gravel, and stone went into effect in January 1984. The increase is 1 cent per ton per year; excluded was limestone used for agricultural purposes. Although the tax increased to 2 cents per ton in 1984, it did not appear to adversely affect output.

The Arkansas Department of Revenue received $23.8 million in severance taxes during fiscal year 1984. Severance taxes were received from oil ($22.5 million), brine ($442,000), natural gas ($384,000), sand and gravel ($325,000), bauxite ($135,000), coal ($5,700), and miscellaneous minerals ($24,400).

During the year, the legislative subcommittee on leasing State-owned lands expressed concern over the low royalty rate for older mineral leases. Older leases date to 1937 with royalty rates for sand and gravel of 2.5 to 5 cents per cubic yard with no termination date. Leases after 1981 were for specific periods with royalties ranging as high as 31.5 cents per cubic yard. Thirty-five permits were outstanding for sand and gravel covering 144 river miles of the Arkansas, Mississippi, Ouachita, and White Rivers. In August, the State Natural Resources Committee imposed a 5-mile limit on the length of river that could be covered by any one sand and gravel lease. Arkansas received $1,063,000 in royalties during fiscal year 1984 from mineral leases. Royalties were received from oil and gas ($760,000) and sand and gravel ($65,000) leases. The balance of $238,000 was bonus payments.

The Arkansas Geological Commission (AGC) continued its program that focused on the prudent development and use of the mineral, water, and energy resources of the State. Outside geologic interest centered on oil and gas, base metals, rare earths, lignite, and diamond exploration. Interest in oil and gas centered in the Ouachita Mountains where limited drilling occurred. AGC continued efforts on a series of oil and gas charts for the Lower Atoka Formation in the subsurface of the Arkansas Valley; to date, 8 of the scheduled 19 charts have been published. AGC has drilled over 1,500 test holes over the last several years in south and northeast Arkansas to determine the extent, characteristics, and quality of lignite. During the year, this work resulted in a lignite report, "Stratigraphic Framework and Distribution of Lignite on Crowley's Ridge, Arkansas." Assistance was also provided to individuals conducting exploration for rare earths in Saline and Hot Spring Counties, for silver and base metals in the Ouachitas, and for diamonds in the southwest part of the State. In cooperation with the U.S. Geological Survey (USGS), the AGC conducted a mineral appraisal in the northern part of Arkansas. Staff geologists also served as advisors in the review of mining reclamation and landfill permits. Two guidebooks were published in addition to "Contributions to the Geology of Arkansas, Volume II," which included articles relating to basement rock, north Arkansas stratigraphy, Ouachita Mountains stratigraphy, and other geologic topics.

Late in the year, the U.S. Bureau of Land Management (BLM) identified 75 parcels of land covering over 22,000 acres of unleased Federal land presumed to contain oil and gas resources. BLM proposed to publish a notice in 1985 detailing the location of these unleased parcels to determine priority of leasing.

The USGS continued several cooperative programs with the AGC concerning water and mineral resources in the State. The USGS published Professional Paper 1300, "Wilderness Mineral Potential." Included in the report were nine areas in Arkansas: five wilderness areas and four roadless areas. The publication was prepared in cooperation with the U.S. Bureau of Mines. Three other Roadless Area Review and Evaluation areas were under study. The USGS also published an open file report, OF 83-0846, "Proceedings of Conference XXIII, a Workshop on Continuing Actions To Reduce Potential Losses From Future Earthquakes in Arkansas and Nearby States." The U.S. Bureau of Mines Tuscaloosa Research Center, under an agreement with the Silica Products Co. Inc., Guion, provided technical assistance in dewatering a clay waste at the plant.

REVIEW BY NONFUEL MINERAL COMMODITIES

NONMETALS

Of the total value of nonfuel minerals in Arkansas in 1984, the major portion was attributed to nonmetals. Four of the eleven announced expansions in the minerals industry involved industrial minerals totaling over $40 million; commodities included bromine, clays, graphite, and vermiculite.

Abrasives (Natural).—During 1984, four companies mined novaculite for oilstone and whetstone products; mine production and value increased over that of 1983. Arkansas ranked first nationally in output of special silica stone abrasives. Finished stone production accounted for 83% of the total value and 21% of the total quantity of special silica stone products sold or used by domestic producers. Novaculite, a dense, hard, fine-grained metamorphosed chert of virtually pure silica, was mined in Garland County by Norton Co. Oilstones Inc. and Hiram A. Smith Whetstone Co. Inc. and in Hot Spring County by Arkansas Whetstone Co. Inc. and Wallis Whetstone Inc. Marvin Wright Whetstone Co. developed a deposit of novaculite in Garland County to market the crude stone. The company also started cutting and finishing whetstone and oilstones during the year at a plant in Hot Spring County. At all operations, output was relatively low with waste material ranging up to 95% of material mined. Some waste material was used in limited applications, with other markets being sought for the rejected material. Several firms only finished small quantities mined in Garland and Hot Spring Counties by other companies. These companies included Arkansas Oilstone Co., Hall's Arkansas Oilstones Inc., Pioneer Whetstone Co., Dan's Whetstone Co. Inc., and Washita Mountain Whetstone Co. Buffalo Stone Corp. shipped deburring media from Garland County.

Barite.—The Arkansas barite industry, severely affected by several factors, remain-

ed shut down in 1984. The last reported production was in 1982 when the State ranked third nationally in output. Milchem Inc.'s $40 million plant at Fancy Hill, completed in 1982, closed the same year. Milchem reportedly will not reopen the plant. Reasons cited for the basic shutdown of the industry were imports, reduced demand, high operating costs, and at Milchem's operation, environmental problems. Reportedly, ore from Nevada handled the limited demand that previously was filled by Arkansas barite.

Bromine.—Arkansas remained the largest domestic bromine producer and accounted for about one-half of the world's output in 1984. Production and value increased about 5% over that of 1983. Bromine occurs in salt brines in the south-central part of the State in Columbia and Union Counties. The highly capital-intensive industry, with an investment of over $300 million, reportedly has 85% of the Nation's capacity to produce bromine chemicals. Because of several adverse factors, which included imports and limited markets, the industry operated at slightly over 50% of capacity at times during 1984. Two companies, Dow Chemical U.S.A. and Ethyl Corp., operated in Columbia County, and two others, Arkansas Chemicals Inc. and Great Lakes Chemical Corp., operated in Union County.

Although operating below capacity, Dow and Ethyl expanded bromine derivative plant capacities during the year to meet future needs. New wells drilled during the year were basically replacement wells. Ethyl started up a 15-million-pound-per-year tetrabromobisphenol—a facility and a new plant to produce sodium bromide and calcium bromide powders. Dow announced plans to build a new calcium bromide plant and modernize its existing bromine plant after phasing out its Midland, MI, operations. Construction plans, which have been deferred since 1979, were scheduled to begin early in 1985 with completion scheduled for 1986. Total costs for the 120-million-pound-per-year plant and other modernizing plans will exceed $30 million. Brine requirements will come from wells in Columbia County and will be transported by existing pipeline. Bromine chemicals are used as gasoline additives, agricultural chemicals, flame retardants for plastics and textiles, pharmaceuticals, oil and gas well completion fluids, fire extinguishing agents, water sanitizers, catalysts, and other industrial chemical intermediates.

The bromine industry actively opposed a free trade area agreement with Israel that would include bromine chemicals. The producers consider bromine chemicals to be sensitive items of trade that should be excluded from any agreement. If included, the industry maintained that the agreement would cause severe economic consequences to the domestic bromine industry with the loss of one-third of the employees in the industry in Arkansas. Imports have tripled in the last 3 years, and the industry predicted that if the agreement includes bromine chemicals, imports would triple again by 1990.

Cement.—Portland cement shipments and value increased slightly over that of 1983. Masonry cement shipments decreased slightly while unit values increased over that of 1983. Two companies, Ideal Cement Co., a subsidiary of Ideal Basic Industries Inc., and Arkansas Cement Corp., a subsidiary of Arkla Inc., produced portland and masonry cement at plants in Saratoga and Foreman, respectively. Both plants, with a total of five kilns, used the wet process.

Major end uses for portland cement were ready-mixed concrete, concrete products, building materials, and highway construction. Raw materials used included chalk, gypsum, iron ore, limestone, and sand. Construction activities increased until midyear and remained constant for the balance of 1984. The Aluminum Co. of America (Alcoa) plant at Bauxite was one of three plants nationally that produced aluminous cement, a nonportland hydraulic cement.

Arkansas Cement continued its plant modification program. During the year, it awarded a contract to convert the largest of its three kilns from direct coal firing to indirect firing. Plans call for converting the plant from wet to dry process, incorporating two-stage preheaters with bypass systems on all three kilns. Also included will be a new raw material storage with blending and handling equipment.

Ideal curtailed operations in October, affecting 90 employees, with plans to resume normal production early in 1985.

Clays.—In 1984, Arkansas' clay industry produced common clay and kaolin with total output increasing over that of 1983. Production and value of common clay increased over that of 1983 while production and value of kaolin decreased 21% and 32%, respectively. Common clay was mined by 8 companies at 16 pits in 10 counties; leading counties were Crittenden, Hot

Spring, and Montgomery. Major uses were in brick and lightweight aggregate. Kaolin was mined by two companies at pits in Pulaski County. Arkansas ranked fourth in the Nation in output of kaolin. Output included unprocessed and calcined high-temperature kaolin. According to the Arkansas Chamber of Commerce, Acme Brick Co. invested over $60,000 for expansion at its Fort Smith plant.

Gem Stones.—Park authorities at the Crater of Diamonds Park in Pike County reported that 85,000 visitors had recovered 1,339 diamonds, compared with 1,501 diamonds in 1983. Total carat weight amounted to 202.26 carats; the largest diamond recovered was 5.58 carats. Of the recovered diamonds, 776 were white, 304 were brown, 241 were yellow, and 18 were uncommon—pink to light green; 14 exceeded 1 carat in weight. Other stones recovered in the State included agate, amethyst, barite, calcite, jasper, quartz, and other semiprecious gems.

Early in the year, Pike County residents approved a proposal to research the possibility of commercial diamond mining near the Crater of Diamonds. Five companies expressed interest in the project. No further actions were made during 1984.

Graphite (Synthetic).—Production and value increased 28% and 20%, respectively, over that of 1983, indicating a decrease in unit value. Arkansas ranked sixth in the Nation in the production of synthetic graphite. The electrodes produced were used in electric arc furnaces to melt scrap for production of steel. Great Lakes Carbon Corp. manufactured graphite at its plant in Ozark, Franklin County. Superior Graphite Co. acquired the graphite anode and electrode plant at Russellville from Dow Chemical Co.; the plant had closed in 1983. The plant has capacities of 3,000 short tons per year of graphite electrodes and 17,000 tons per year of extruded and baked carbon shapes. The plant will process silicon carbide made at Superior's Hopkinsville, KY, plant and will also utilize some of the enhanced carbons made at Hopkinsville. The Russellville plant was scheduled to be in operation late in the year.

Gypsum.—Output and value increased over that of 1983; output reached its highest level in 10 years. Crude gypsum was produced by Weyerhaeuser Co. in Howard County and Harrison Gypsum Co. Inc. in Pike County; Weyerhaeuser's Briar Mine and plant were 1 of the top 10 producing units in the Nation in 1984. Calcined gypsum was produced by Temple Eastex Inc., Crittenden County, and Weyerhaeuser, Howard County. Production increased while value decreased from that of 1983. During the year, Weyerhaeuser celebrated 3 million hours of operation without a lost-time accident at its Briar facilities. In the last 21 years, the operation has registered 11 accident-free years.

Lime.—Output and value of quicklime and hydrated lime decreased from that of 1983. Output of total lime was at its lowest level in over 15 years. Quicklime and hydrated lime were produced by Arkansas Lime Co., Independence County. Alcoa, which had produced quicklime, permanently closed in 1983.

Nitrogen.—Agrico Chemical Co., Blytheville, produced anhydrous ammonia during the year. The facility had a rated annual capacity of 407,000 short tons.

Perlite (Expanded).—Strong-Lite Products Corp. expanded perlite shipped in from out of State at its plant in Pine Bluff, Jefferson County. Output remained at the same level as that of 1983 while value increased 4% over that of 1983. Expanded perlite was used in concrete aggregates and horticultural applications.

Quartz.—Various grades of natural quartz were surface mined and processed by Coleman Crystal Inc. at Jessieville, and by Ocus Stanley and Burrow Mining Co. at Mount Ida. Coleman was the major domestic producer of lascas for electronics. Estimated production of lasca increased because of increased market demands. Geomex Mine Services Inc., which purchased the old Coleman Mine in 1983, constructed new processing facilities and went into full production by yearend. The Nos. 1 and 2 grades of quartz were primarily used in optics and electronics. Most of grades Nos. 3 and 4 were used as a medium to manufacture higher grade material. Geomex reported that production could reach 3.3 million pounds per year as demand increased. Much of the output was shipped to Japan and the Federal Republic of Germany.

Sand and Gravel.—Arkansas produced both construction and industrial sand and gravel in 1984. Production was from 61 companies producing from 78 pits in 40 counties. Total output increased over that of 1983, but was still well below the record-high output years of the 1970's.

Construction.—Construction sand and gravel production is surveyed by the U.S.

Bureau of Mines for even-numbered years only; therefore, this chapter contains only estimates for 1983. Data for odd-numbered years are based on annual company estimates made before yearend.

Construction sand and gravel was the fourth leading commodity in value among the nonfuel minerals produced in Arkansas. The increase in 1984 was basically due to a surge in construction activities that increased by midyear and maintained its momentum through yearend. Most operations were relatively small with no individual pit producing as much as 1 million short tons. Construction sand and gravel was produced at 68 operations in 38 counties. Leading counties were Little River, Ouachita, and Pulaski. Opposition to dredging sand and gravel from waterways continued through the year because of reported environmental problems. Major objections centered on loss of water quality, deleterious effect on fish, and loss of recreation utilization. These objections have been recognized and will be considered by the State in future leasing contracts.

Table 4.—Arkansas: Construction sand and gravel sold or used in 1984, by major use category

Use	Quantity (thousand short tons)	Value (thousands)	Value per ton
Concrete aggregate	4,215	$13,743	$3.26
Plaster and gunite sands	126	301	2.38
Concrete products	W	W	2.55
Asphaltic concrete	164	384	2.34
Road base and coverings	678	1,189	1.75
Fill	W	W	1.84
Other[1]	3,151	8,170	2.59
Total or average	8,334	[2]23,786	2.85

W Withheld to avoid disclosing company proprietary data; included with "Other."
[1]Includes other unspecified uses and uses indicated by symbol W.
[2]Data do not add to total shown because of independent rounding.

Industrial.—Five companies produced industrial sand and gravel from five counties during 1984, with output and value increasing. Producers were Silica Products, Gifford-Hill & Co. Inc., Ideal Cement, Turner Trucking Co., and Arkhola Sand & Gravel Co. No one operation produced more than 500,000 tons. Major uses for industrial sand and gravel were blasting abrasives, foundry molds, and glassmaking. Most of the output was shipped by truck.

Stone (Crushed).—Stone production is surveyed by the U.S. Bureau of Mines for odd-numbered years only; therefore, this chapter contains only estimates for 1984. Data for even-numbered years are based on annual company estimates made before yearend.

Crushed stone ranked third in mineral value in Arkansas with output estimated to have increased over that of 1983. The estimated increase, however, did not reach the levels of output during the 1970's. Material mined included limestone, granite (syenite), sandstone, slate, and dolomite. Arkansas led the Nation in 1983 in output of crushed sandstone and was one of the top three States in crushed slate production. Leading counties in 1983 were Pulaski, Lawrence, and Independence. Crushed stone was used primarily in cement manufacture, ballast, and aggregate. Most companies increased output because of increased construction activities, but several operated intermittently because construction activities were out of their marketing areas.

Sulfur (Recovered).—Two companies recovered sulfur from their operations with output and value increasing over that of 1983, the third straight year of increased output. Phillips Petroleum Co., Lafayette County, recovered sulfur as a byproduct of petroleum refining at its McKamie plant, while Ethyl, Columbia County, recovered sulfur during bromine extraction at its Magnolia facility.

Talc.—The Milwhite Co. Inc. mined talc from its Congo Pit near Benton and processed the ore at its mill in Bryant. Reduced demand for roofing materials and as an industrial filler resulted in lower output from that of 1983 and well below the record-high output in 1982.

Tripoli.—Malvern Minerals Co. Inc., Garland County, remained the State's only producer of tripoli with output and value increasing over that of 1983. The company completed expansion plans at its plant early in the year. Output was used primarily as a filler with some used as an abrasive.

Vermiculite (Exfoliated).—Strong-Lite, Pine Bluff, and W. R. Grace & Co., North Little Rock, exfoliated crude vermiculite from out of State with output decreasing slightly from that of 1983; unit values increased. Crude vermiculite for Strong-Lite was imported from the Republic of South Africa. According to the Arkansas Chamber of Commerce, Strong-Lite started a $175,000 expansion program at its Pine Bluff plant. Exfoliated vermiculite was used for texturing paints and in aggregate, insulation, agriculture, and fireproofing.

METALS

Primary metal production, although not a significant industry in the State, showed signs of expansion, which would contribute to the economic well-being of Arkansas. The metals industry depended mainly on out-of-State raw materials with limited input from sources in Arkansas. According to the Arkansas Chamber of Commerce, seven expansions with expenditures of about $26 million were announced in metals-related industries.

Aluminum.—Arkansas was 1 of 17 States with primary aluminum production facilities, ranking 10th nationally in output. Production and value increased over that of 1983. Reynolds Metals Co. operated the Jones Mill and the Arkadelphia facilities during the year. The Jones Mill started the year at full capacity but shut down two potlines in August and a third in November, reducing output to 40% of capacity. The shutdowns were attributed to rising inventories and high power costs. The Arkadelphia facility operated at 100% capacity on low-cost hydroelectric power. Reynolds' Hot Springs continuous rolling mill at yearend was at 75% of its 200,000-short-ton-per-year capacity. New computer models were being developed to increase productivity by 15%. The Malvern cable plant, closed since 1982, reopened early in the year and by yearend was operating at about 70% of its 30,000-ton-per-year capacity. The facility was able to reopen after Reynolds and the union reached an agreement on wages and benefits. Reynolds' Hurricane Creek alumina chemicals plant, closed since 1983, permanently closed late in the year. Reynolds wrote off $11.6 million for the permanent closure of the plant. Reynolds' alumina plant near Corpus Christi, TX, imported bauxite raw materials from Australia, Brazil, and Africa, in order of volume, and supplied alumina to the two Arkansas primary aluminum plants.

Bauxite.—Arkansas remained the leading State in output of bauxite with production and value increasing, stopping a downward trend that started in 1977. Despite the increase, output was still much lower than that of the 1970's. Production was from two operations in Saline County, Alcoa and American Cyanamid Co. Porocel Corp., Little Rock, produced activated bauxite from purchased ore. Alcoa, which mines bauxite for its alumina plant at Bauxite, operated at low levels of capacity. Although shipments by Alcoa increased 10% over that of 1983, the company had a loss of $4.8 million for 1984 compared with $2 million in 1983. Alcoa reduced employment levels from 1,678 in 1979 to 1,100 at the end of 1984. To become more competitive, Alcoa announced plans to begin mining higher grade ores, reduce spending for capital projects in 1985, and reduce personnel. The company dropped certain product lines currently being sold at prices less than in 1981. The plant produced various chemicals for use in refractories, ceramics, coatings, and other uses.

Norton and Alcoa's partnership in production of proppants (Norton-Alcoa Proppant Co.) resulted in startup of construction in June of a $50 million expansion of Norton's facilities at Fort Smith. Construction was scheduled for completion in July 1985 with an increase of output from 100 to 300 million pounds per year. Alcoa started supplying calcined bauxite to Norton early in the year. The proppants are used in hydraulic fracturing to stimulate flow rates of oil and gas from wells.

American Cyanamid operated the Quapaw Pit and was developing the Globe Pit. The company processed and partially calcined bauxite for the production of aluminum sulfate, which is used in the paper industry and for water treatment. Business remained firm through most of the year with reduced demand in the last 3 months of 1984.

Iron and Steel.—National Tube Co., Little Rock, formerly York-Hannover Seamless Tube Inc., announced plans to start construction of its 250,000-short-ton-per-year pipe minimill early in 1985. Formerly announced for Little Rock, the $300 million facility will be built in Pine Bluff. The plant was scheduled for completion in 27 months, or by mid-1988. The seamless tubing would be used by the oil and gas industry.

Western Tube & Conduit Corp., a subsid-

iary of Sumitomo Metal Industries Ltd., announced plans to build a $10 million welded tube mill in Little Rock. The 36,000-metric-ton-per-year plant was scheduled for completion by mid-1985. The mill will manufacture conduits for electric cable and wire.

Quanex Corp. resumed construction of its $98 million specialty bar mill at Fort Smith. Construction of the 280,000-ton-per-year facility started in 1981, was halted in 1983, and resumed early in 1984. Quanex shipped its first product from the new facility in November. The facility, with two 55-ton ultrahigh power electric furnaces and three rotary continuous casters, reportedly would be the largest producer of rotary cast steel in the Nation. Quanex planned to produce special bar quality seam-free carbon and alloy steel bars for the forging industry making automotive and machinery parts.

According to the "Arkansas Directory of Manufacturers," seven gray iron and three steel foundries were in operation in the State. Of the announced expansions in the metals products industry, three involved foundries with investments of nearly $8 million.

Vanadium.—Umetco Minerals Corp., a subsidiary of Union Carbide Corp., was Arkansas' sole vanadium producer. The mine and mill in Garland County, closed since June 1982, reopened in July 1984. The company was developing the Christie Pit, about 7 miles from the plant, with two smaller pits adjacent to the plant. The plant operated at capacity throughout the last half of the year with markets expected to hold firm through 1985. The facility produced vanadium pentoxide from the vanadiferous clays, which was converted to ferrovanadium at other locations. The chief market was in steel alloys, but increased imports have adversely impacted the domestic industry.

[1]State Mineral Officer, Bureau of Mines, Tuscaloosa, AL.
[2]Geologist, Arkansas Geological Commission, Little Rock, AR.

Table 5.—Principal producers

Commodity and company	Address	Type of activity	County
Abrasives:			
Oilstones and whetstones:			
Smith Whetstone Inc	1500 Sleepy Valley Rd. Hot Springs, AR 71901	Quarry	Garland.
Tripoli:			
Malvern Minerals Co. Inc	Box 1246 Hot Springs, AR 71901	Mine	Do.
Bauxite:			
Aluminum Co. of America[1]	1501 Alcoa Bldg. Pittsburgh, PA 15219	Mine and plant	Saline.
American Cyanamid Co	Berdan Ave. Wayne, NJ 07470	do	Do.
Bromine:			
Arkansas Chemicals Inc	Route 6, Box 98 El Dorado, AR 71730	Brine wells and plant.	Union.
Dow Chemical U.S.A., Magnolia plant	2030 Dow Center Midland, MI 48640	do	Columbia.
Ethyl Corp., Arkansas Div	Box 729 Magnolia, AR 71753	do	Do.
Great Lakes Chemical Corp	Box 2200 West Lafayette, IN 47906	do	Union.
Cement:			
Arkansas Cement Corp., a subsidiary of Arkla Inc.[1]	Box 130 Foreman, AR 71836	Plant	Little River.
Ideal Cement Co., a subsidiary of Ideal Basic Industries Inc.[1]	Box 8789 Denver, CO 80201	do	Howard.
Clays:			
Acme Brick Co., a division of Justin Industries Inc.	Box 425 Fort Worth, TX 76101	Pits and plants	Hot Spring and Sebastian.
Arkansas Lightweight Aggregate Corp	El Dorado, AR 71730	Pit and plant	Crittenden.
Eureka Brick & Tile Co	Box 379 Clarksville, AR 72830	Mine	Johnson.
A. P. Green Refractories Co., a subsidiary of United States Gypsum Co.	Box 6057 Little Rock, AR 72216	Pit and plant	Pulaski.
Gypsum:			
Harrison Gypsum Co. Inc	Box 336 Lindsay, OK 73052	Mine	Pike.
Weyerhaeuser Co., Dierks Div	Route 4, Box 78 Nashville, AR 71852	Mine and plant	Howard.
Lime:			
Arkansas Lime Co., a subsidiary of Rangaire Corp.[1]	Box 2356 Batesville, AR 72501	Quarry and plant	Independence.

See footnotes at end of table.

Table 5.—Principal producers —Continued

Commodity and company	Address	Type of activity	County
Perlite (expanded):			
Strong-Lite Products Corp	Box 8029 Pine Bluff, AR 71611	Plant	Jefferson.
Sand and gravel:			
Construction:			
Jeffrey Sand Co	Box 998 Fort Smith, AR 72901	Pits and plants	Faulkner, Pulaski, Sebastian.
St. Francis Materials Co., a division of Ben M. Hogan Co. Inc	Box 999 Forrest City, AR 72335	do	Calhoun, Craighead, Poinsett, St. Francis.
Industrial:			
Gifford-Hill & Co. Inc.[2]	Box 6615 Shreveport, LA 71106	Pits	Miller.
Silica Products Co. Inc	Box 248 Guion, AR 72540	Pit	Izard.
Stone:			
Granite:			
Freshour Construction Co. Inc	Drawer AF Cabot, AR 72023	Quarry	Pulaski.
McGeorge Contracting Co. Inc	Box 7008 Pine Bluff, AR 71611	Quarries	Do.
Minnesota Mining & Manufacturing Co.	3M Center, 224-65 W St. Paul, MN 55101	Quarry	Do.
Limestone:			
McClinton-Anchor Co., a subsidiary of Ashland Oil Inc.	Box 1367 Fayetteville, AR 72701	Quarries	Benton, Madison, Washington.
Midwest Lime Co	Box 2608 Batesville, AR 72501	Quarry	Independence.
Sandstone:			
Arkhola Sand & Gravel Co.,[1] a subsidiary of Ashland Oil Inc.	Box 1627 Fort Smith, AR 72901	Quarries	Crawford and Sebastian.
H M B Construction Co	Box 5606 Texarkana, TX 75501	Quarry	Sevier.
Ben M. Hogan Co. Inc.[1]	Box 2960 Little Rock, AR 72203	Quarries	White.
M & M Rock Co. Inc	Box 1130 Conway, AR 72032	do	Faulkner, Perry, White.
Slate:			
Bird & Son Inc	Drawer 151 Glenwood, AR 71943	Quarry	Montgomery.
Sulfur (recovered):			
Ethyl Corp., Arkansas Div	Box 729 Magnolia, AR 71753	Sulfur recovered in bromine extraction.	Columbia.
Phillips Petroleum Co	724 Adams Bldg Bartlesville, OK 74004	Sulfur recovered as a byproduct of petroleum refining.	Lafayette.
Talc:			
The Milwhite Co. Inc	Box 15038 Houston, TX 77020	Mine and plant	Saline.
Vanadium:			
Union Carbide Corp., Metals Div	Route 6, Box 943 Hot Springs, AR 71901	Mine and mill	Garland.
Vermiculite (exfoliated):			
W. R. Grace & Co	62 Whittemore Ave Cambridge, MA 02140	Plant	Pulaski.
Strong-Lite Products Corp	Box 8029 Pine Bluff, AR 71611	do	Jefferson.

[1]Also produced limestone.
[2]Also produced construction sand and gravel in Ouachita County.

U.S. GOVERNMENT PRINTING OFFICE: 1986-491-457:20110